Bird Study

ISSN: 0006-3657 (Print) 1944-6705 (Online) Journal homepage: http://www.tandfonline.com/loi/tbis20

Winter diet of urban roosting Long-eared Owls Asio otus in northern Italy: the importance of the Brown Rat Rattus norvegicus

A. Pirovano , D. Rubolini , S. Brambilla & N. Ferrari

To cite this article: A. Pirovano , D. Rubolini , S. Brambilla & N. Ferrari (2000) Winter diet of urban roosting Long-eared Owls Asio otus in northern Italy: the importance of the Brown Rat Rattus norvegicus , Bird Study, 47:2, 242-244, DOI: 10.1080/00063650009461181

To link to this article: http://dx.doi.org/10.1080/00063650009461181

Published online: 29 Mar 2010.

Submit your article to this journal

Article views: 194

View related articles

Citing articles: 7 View citing articles

Full Terms & Conditions of access and use can be found at
http://www.tandfonline.com/action/journalInformation?journalCode=tbis20

Download by: [Politecnico di Milano Bibl] **Date:** 17 December 2015, At: 01:21

Bird Study (2000) **47,** 242–244

SHORT REPORT

Winter diet of urban roosting Long-eared Owls *Asio otus* in northern Italy: the importance of the Brown Rat *Rattus norvegicus*

ANDREA PIROVANO[1], DIEGO RUBOLINI[2]*, SILVIA BRAMBILLA[3] and NICOLA FERRARI[3]
[1]Centro Studi Faunistica dei Vertebrati, c/o Civico Museo di Storia Naturale, c.so Venezia 55, 20121 Milano, Italy, [2]Stazione Ornitologica La Passata, Miragolo S. Marco di Zogno (BG), Italy and [3]via Marcora 11, 20100 Milano, Italy

Downloaded by [Politecnico di Milano Bibl] at 01:21 17 December 2015

The diet of Long-eared Owls *Asio otus* has been extensively reviewed[1–3] and is generally well studied in northern Europe,[4,5] Britain[6,7] and southern Europe.[3,8–10] Some indications of a winter dietary adaptation to man-made environments have been reported (e.g. a dominance of the House Mouse *Mus domesticus*[11] or an increase of birds in the diet[4]). Here we analyse the diet of urban roosting Long-eared Owls, to assess whether such adaptation to an urban environment occurs.

In the city of Milan, northern Italy (45°28′N 9°12′E), a large roost of Long-eared Owls (up to 76 birds) has occurred every winter (October–April), since at least 1988 (A. Pirovano, unpubl. data). The study site is located along a public footpath and in private gardens, with two sub-roosts 150 m apart. Data from both sites were pooled for most analyses. The owls hunt in the suburbs of the city and the adjoining farmland.[12]

Pellets were collected between October 1996 and April 1997, pooled by month for analyses and examined following standard techniques.[13] Although the pellets could belong to a non-independent sample, we have minimized bias by using an average value for every month.[14] Estimates of biomass were derived from the literature[3,15] and from specimens collected in the study area. As in other studies, birds were considered as a single category[3,5,9,10] and they were assigned an average mass of 20 g each.[3] The weight of predated Brown Rats *Rattus norvegicus*, the only rat species in our study area,[16] was estimated by measuring mandible length and using the regression equation given by Di Palma & Massa.[15] In biomass calculations, rats were assigned the average monthly weight.

A total of 2760 prey items was identified in 2054 pellets. Mammals accounted for 91.0% of the diet in number; the remaining 9.0% was birds (see Appendix). Diet composition varied significantly between months ($\chi^2 = 395$, df = 24, $P < 0.001$, computed on numbers of the five main prey categories, Fig. 1a). Brown Rat is very important in the diet of Long-eared Owl in this locality, as is clear from consumed biomass (overall 65.2%, range 54.4–76.5% per month, Fig. 1b). Rats are often represented in the diet of the Long-eared Owl (80% of 18 studies), but few studies show such a large presence both in terms of number (20.5%) and biomass (*%N*: median = 0.7, range 0.1–4.7%, $n = 14$ studies; *%B*: median = 4.8, range 0.5–17.5%, $n = 9$ studies).

Weight (mean ± sd) of rats eaten was 140.0 ± 30.2 g (range 89.8–224.5 g, $n = 260$), suggesting mainly young or subadults in a non-reproductive state.[17] Rats predated in autumn and spring months were lighter than those taken in winter months (quadratic regression of individual rat weights on month, $F_{257} = 37.33$, $P < 0.001$, $r^2 = 0.23$) and monthly proportion (*%N*) of rats in the diet was negatively correlated with monthly mean rat weight (data from both sub-roosts, $r_s = -0.73$, $n = 14$, $P = 0.003$). This is most probably explained by a decrease in availability of young rats in mid-winter months,[18] together with a selection of smaller individuals, that may be easier to capture compared with large and aggressive ones.

*Correspondence author: via Vespri Siciliani 5, 20146 Milano, Italy.
Email: rubolini@mail.inet.it

© 2000 British Trust for Ornithology

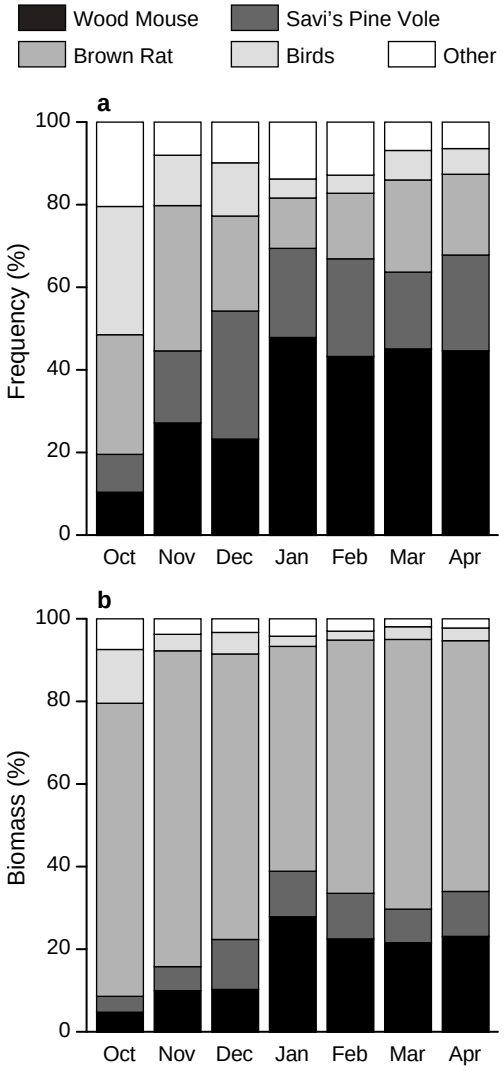

Figure 1. Monthly diet composition, October 1996 to April 1997: (a) number as a percentage of the diet for the five main prey categories; (b) biomass as a percentage of the diet. The category 'other' includes all mammal species with an overall frequency less than 5% in number. (Savi's Pine Vole *Pitymys savii*).

The presence of the Wood Mouse *Apodemus sylvaticus* in the diet is negatively correlated with that of the Brown Rat (monthly $\%N$: $r_s = -0.75$, $n = 7$, $P = 0.052$; monthly $\%B$: $r_s = -0.96$, $n = 7$, $P < 0.001$). Despite being numerically most abundant (37.8%), the Wood Mouse seems to be an alternative prey to the Brown Rat, given the dominance of rats by biomass.

The low value of the prey/pellet ratio and the high value of the average meal (see Appendix) compared with the literature (mean ± sd, prey/pellet = 2.1 ± 0.3, $n = 7$ studies; average meal = 45.9 ± 6.9 g, $n = 8$ studies) may be an index of the energetic advantage of eating rats: because they are heavier than other prey, owls need to hunt less often and can obtain a larger amount of food per hunting trip. This may explain the choice of an urban winter roost site.

In conclusion, we confirm the trophic plasticity of Long-eared Owls in their Italian wintering range[3–9] and highlight their ability to adapt to an urban environment.

ACKNOWLEDGEMENTS

We thank H. Hauffe, G. Bogliani, P. Galeotti, Dr M. Marquiss and Dr P. Walsh for useful comments on the manuscript. We also thank B. Chiarenzi, S. De Michelis, S. Di Martino, L. Fornasari, T. Londei, F. Noetzli and A. Zilio for collaboration. The Editor kindly improved the final version of the manuscript.

REFERENCES

1. Marti, C.D. (1976) A review of prey selection by the Long-eared Owl. *Condor*, **78**, 331–336.
2. Cramp, S. & Simmons, K.E.L., eds (1985) *Birds of the Western Palearctic*, Vol. 4. Oxford University Press, Oxford.
3. Galeotti, P. & Canova, L. (1994) Winter diet of Long-eared Owls (*Asio otus*) in the Po Plain (Northern Italy*). J. Raptor Res.*, **28**, 265–268.
4. Wijnandts, H. (1984) Ecological energetics of the Long-eared Owl (*Asio otus*). *Ardea*, **72**, 1–92.
5. Nilsson, I.N. (1981) Seasonal changes in food of the Long-eared Owl in southern Sweden. *Ornis Scand.*, **12**, 216–223.
6. Village, A. (1981) The diet and breeding of Long-eared Owls in relation to vole numbers. *Bird Study*, **28**, 215–224.
7. Glue, D.E. & Hammond, G.J. (1974) Feeding ecology of the Long-eared Owl in Britain and Ireland. *Br. Birds*, **67**, 361–369.
8. Araujo, J., Rey, J.M., Landin, A. & Moreno, A. (1974) Contribucion al estudio del Buho chico (*Asio otus*) en España. *Ardeola*, **19**, 397–427.
9. Canova, L. (1989) Influence of snow cover on prey selection by Long-eared Owls *Asio otus*. *Ethol. Ecol. Evol.*, **1**, 367–372.
10. Tome, D. (1991) Diet of the Long-eared Owl *Asio otus* in Jugoslavia. *Ornis Fenn.*, **68**, 114–118.

Downloaded by [Politecnico di Milano Bibl] at 01:21 17 December 2015

11. Bosakowski, T. (1984) Roost selection and behavior of the Long-eared Owl (*Asio otus*) wintering in New Jersey. *Raptor Res.*, **18**, 137–142.
12. Pirovano, A., Rubolini, D., De Michelis, S. & Ferrari, N. (1997) Primi dati sull'ecologia di un roost di Gufo comune *Asio otus* in ambiente urbano. *Avocetta*, **21**, 89.
13. Yalden, D.W. (1977) *The Identification of Remains in Owl Pellets*. Occasional Publication of the Mammal Society, London.
14. Toyne, E.P. (1998) Breeding season diet of the Goshawk *Accipiter gentilis* in Wales. *Ibis*, **140**, 569–579.
15. Di Palma, M.G. & Massa, B. (1981) Contributo metodologico per lo studio dell'alimentazione dei rapaci. In *Atti I° Convegno Italiano di Ornitologia* (ed. A. Farina), pp. 69–76. Mus. St. Nat. Lunigianna, Aula.
16. Fornasari, L., Bani, L. & de Carli, E. (1997) *Studi Faunistici per il Piano d'Area 'Chiaravalle-Selvanesco' (Parco Agricolo Sud Milano)*. S.I.R.O., Milan.
17. Davis, D.E. (1949) The weight of wild Brown Rats at sexual maturity. *J. Mammal.*, **30**, 125–130.
18. Perry, J.S. (1946) The reproduction of the wild brown rat (*Rattus norvegicus* Erxleben). *Proc. Zool. Soc. Lond.*, **115**, 19–46.

(MS received 12 December 1998; revised MS accepted 5 August 1999)

APPENDIX

Monthly diet composition, October 1996 to April 1997, number of prey items (*n*), percentage of prey in number (%*N*) and biomas (%*B*) according to prey species.

	Oct		Nov		Dec		Jan		Feb		Mar		Apr		Total		
Prey species	%*N*	%*B*	%*N*	%*B*	%*N*	%*B*	%*N*	%*B*	%*N*	%*B*	%*N*	%*B*	%*N*	%*B*	*n*	%*N*	%*B*
Rodentia																	
Apodemus sylvaticus	10.4	4.6	27.2	9.9	23.1	10.0	47.9	27.5	43.2	22.4	45.1	21.3	44.6	23.0	1043	37.8	18.0
Micromys minutus	0.5	0.1	2.2	0.2	3.1	0.3	9.0	1.3	6.7	0.9	3.0	0.4	1.3	0.2	132	4.8	0.6
Mus domesticus	2.7	0.7	1.9	0.4	2.4	0.6	1.9	0.6	2.4	0.7	1.6	0.4	0.6	0.2	56	2.0	0.6
Rattus norvegicus	29.0	71.4	35.0	76.5	23.1	69.3	12.0	54.4	16.1	61.2	22.2	65.6	19.8	60.8	567	20.5	65.1
Muridae spp.	0.9	0.4	1.3	0.5	0.7	0.3	1.3	0.8	2.0	1.1	1.4	0.7	3.8	2.0	43	1.6	0.8
Pitymys savii	9.1	3.7	17.5	5.8	31.0	12.2	21.6	11.3	23.4	11.0	18.6	8.0	22.9	10.7	587	21.2	9.2
Microtus arvalis	–	–	0.6	0.2	1.4	0.6	0.6	0.4	0.7	0.4	0.2	0.1	–	–	16	0.6	0.3
Arvicola terrestris	2.3	4.1	1.6	2.3	0.7	1.2	0.4	1.0	0	0	0.2	0.4	–	–	15	0.5	1.1
Muscardinus avellanarius	–	–	–	–	–	0	0.2	0.2	–	–	–	–	–	0	1	0.0	0.0
Insectivora																	
Crocidura leucodon	0.9	0.1	–	–	–	–	–	–	–	–	–	–	–	–	2	0.1	0.0
Crocidura suaveolens	–	–	–	–	–	–	0.2	0.0	–	–	–	–	–	–	1	0.0	0.0
Crocidura sp.	1.4	0.2	–	–	–	–	–	–	0.8	0.1	0.5	0.1	0.6	0.1	13	0.5	0.1
Sorex araneus	0.5	0.1	–	–	–	–	–	–	0.1	0.0	–	–	–	0	2	0.1	0.0
Chiroptera																	
Pipistrellus kuhlii	10.9	1.5	0.3	0.0	1.7	0.2	–	–	–	–	0.2	0.0	–	–	31	1.1	0.2
Chiroptera spp.	0.5	0.1	–	–	–	–	–	–	0.1	0.0	–	–	–	–	2	0.1	0.0
Aves	31.2	13.1	12.5	4.3	12.9	5.3	4.8	2.6	4.5	2.2	7.0	3.1	6.4	3.1	249	9.0	4.0
Pellet number	133		296		251		465		471		320		118		2054		
Prey number	221		320		294		476		851		441		157		2760		
Prey/pellet	1.66		1.08		1.17		1.02		1.81		1.38		1.33		1.34		
Average meal[a]	79.19		63.19		57.31		37.75		73.87		61.94		54.74		59.52		
Diet breadth[b]	4.67		4.09		4.51		3.31		3.63		3.40		3.37		4.14		

[a]Average meal is defined as: (mean prey weight) × (prey/pellet). [b]Diet breadth according to Levins' index, NB = $1/\Sigma p_i^2$, where p_i is the proportion of the prey.

Downloaded by [Politecnico di Milano Bibl] at 01:21 17 December 2015